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# Integrated Management of Water, Forest, and Land Resources in Nepal: Opportunities for Improved Livelihood<sup>1</sup>

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## Summary

Successful activities by both forest users' groups (FUGs) and water users' groups (WUGs) make important contributions to the livelihoods of the people in Nepal. This study explores the possibility of integration or establishing linkage between these two that could have direct impact on reducing poverty at local level. The findings of this study are based on fieldwork carried out in two catchments in western Nepal. Initial field study found that FUGs and WUGs have high impact on local livelihoods, community affairs, and socio-institutional aspects. There were no significant differences observed in FUG and WUG management at the two catchments except for the kinds of conflicts/problems that are inherent in big and small irrigation systems. The positive impacts of these institutions could be multiplied considerably if the two can be integrated or their activities coordinated or linked at the catchment level. It is observed however, that challenges do exist, which need to be addressed to cash in on the opportunities for the integration of these two institutions.

## Introduction

Integrated natural resources management (INRM) at the catchment level has been evolving together with concepts of integrated water resources management

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(IWRM). Despite the increased thrust in international meetings and policy forum on the need of basin-level planning and application of IWRM, literature that provides a solid understanding of the integration process at the catchment level in developing countries is limited. In addition, actual cases of the IWRM framework at local level are inadequate in South Asia including Nepal, albeit the consensus at the national policy-making bodies for the need of IWRM framework exists.

In this context, this study tries to document the existing interaction process that links FUGs and WUGs at the catchment level and explores the possibility of integrating their activities. It is believed that the integration of activities of FUGs and WUGs at the catchment level could lead to better management of these resources for the increased and wider benefit to the community. The integration/linkage is also expected to resolve various existing intra- and interinstitutional conflicts and hence facilitate other developmental activities that support rural livelihoods. The major objective of the study is to learn community-based strategies for the sustainable management of water, forest, and land resources at the catchment level, through the experience of FUGs and WUGs, to identify potential areas for action research based on this assessment.

## Research Approach

The research was conducted in two irrigation systems—Begnash irrigation system and Bhanushera irrigation system in Kaski and Tanahu districts, respectively, at the two catchments in the two districts<sup>6</sup> of Gandaki River Basin in Western Nepal (Figure 1). Research sites were selected in consultation with respective district irrigation offices (DIOs) and district forest offices (DFOs). The irrigation system was taken as the selection unit because of the impracticability of studying a large number of FUGs and WUGs present in the catchment due to the exploratory nature of the study and availability of resources.

During the field visit, quantitative and qualitative data were collected at the catchment and household levels. Quantitative data focused at generating information at the household level. A questionnaire consisting of inquiries on household livelihood status and their relationship with FUGs and WUGs was designed. A total of 30 households were surveyed by appointing two local facilitators in the Begnash Irrigation Project area. The information for the Bhanushera Irrigation Project was collected through group discussions and secondary sources. Qualitative data mainly focused on collecting information from community stakeholders during group discussions. Direct observation of the local conditions of the resources that entailed visiting forest and irrigation canals also formed part of the qualitative assessment. Few PRA methods like resource mapping, oral histories on resource use pattern, and land use changes, etc. were also utilized.

## Profile of the Study Sites

### The Irrigation Systems

The construction of the Begnash irrigation system with a command area of 580 ha was initiated in 1984 and was completed in 1988 by the Department of Irrigation (DOI) under loan assistance from ADB. Three-tier WUGs are formed to manage this irrigation system and management transfer to the user groups is under way. The canal network of this irrigation system did not include the 157

Figure 1. Location Area of Study Sites



ha of land at the tail end, which has continued to be the most contentious issue in the catchment.

The Bhanushera irrigation system on the other hand, is a small farmer managed irrigation system (FMIS) with a total command area of 20 ha. Two years ago, DOI assisted in renovating and extending the canal network at the request of users, after which the users formally registered WUGs. The community now manages the entire system and there are no management controversies among users.

### The Forest Users Group

Seven FUGs were studied, including five in Begnas and two in Bhanushera—all near the irrigation systems. The profile of the FUGs (Table 1) indicates that some FUGs were as old as 12 years and some were recently formed.

### Existing Land Use Pattern

The studied catchments are undergoing rapid land use changes enforced by new market pressures in the region. The total area is much larger (1,130 ha) in the

Table 1. List of FUGs Studied in the Two Catchments

Catchment	Name of FUG	District	Location	Date of Formation	Area (ha)	Total Members (HHS)	Forest-Dependent Population (%)	Main Forest Species <sup>a</sup>
Begnas	SaunePani Bareli	Kaski	Lekhnath Municipality-9	1990	16.0	NA	50	Sal, Chilaune, Katush
	Syankhudi Simle	Kaski	Majthana-6	1990	29.8	52	50	Sal, Chilaune, Katush
	Panch Bhaiya	Kaski	Lekhnath Municipality-11	1997	235.3	378	75	Sal, Chilaune, Katush
	SaunePani Thantdanda	Kaski	Lekhnath Municipality-8	2001	NA	NA	20	Sal, Chilaune
	Malmul	Kaski	Lekhnath Municipality-13	1996	115	170	25	Sal, Chilaune
Bhanu-shera	Ahal Danda	Tanahu	Bandipur VDC-4	1994	156.6	150	90	Sal, Chilaune, Katush
	Chandisthan	Tanahu	Bhanu VDC-5	2002	35.7	135	100	Sal, Chilaune

NA = data not available.

<sup>a</sup> *Castanopsis indica* (katus), *Schima walichii* (chilaune), *Artocarpus intergra shorea robusta* (sal).

Begnas catchment than that of the Bhanushera catchment (75 ha). The construction of irrigation systems and delineation of community forest area have also brought changes in land use pattern in the catchment.

The forest area in both catchments indicates users' awareness of resource conservation and utilization as it covers almost one third of the area. The irrigation intensity in Begnas area is almost double compared with the latter. This shows that land resource is more productively used in the Begnas catchment due to availability of irrigation facilities and there is possibility of productive use of land through irrigation expansion in Bhanushera.

#### Land Tenure and Farm Size

In the catchments, land tenure and farm size distribution determine the well-being of a farmer. A farmer with no land or small size of land is often the poorest. Though large landholding is not always the representative of the rich, it certainly indicates that the farmer is socially and economically better positioned than others in the community. Table 2 depicts the land tenure and farm size distribution in the two catchments.

Among the total 550 households in the Begnas catchment, a large proportion (65%) owns the land and a majority (58%) are small farmers having less than 0.5 ha of land. The percentage of large (1.0–1.5 ha) and medium landholders

Table 2. Land Use Pattern in the Study Sites

Land Use Type	Area (ha)		Land Use (%)	
	Begnas Catchment	Bhanu Shera Catchment	Begnas Catchment	Bhanu Shera Catchment
Irrigated Land	580	20	51.33	28.57
Rain-fed Land	154	20	13.63	28.57
Forest/Scrubland	315	20	27.87	28.57
Grazing Land	81	15	7.17	14.29
Gross Command Area	1130	75	100.00	100.00

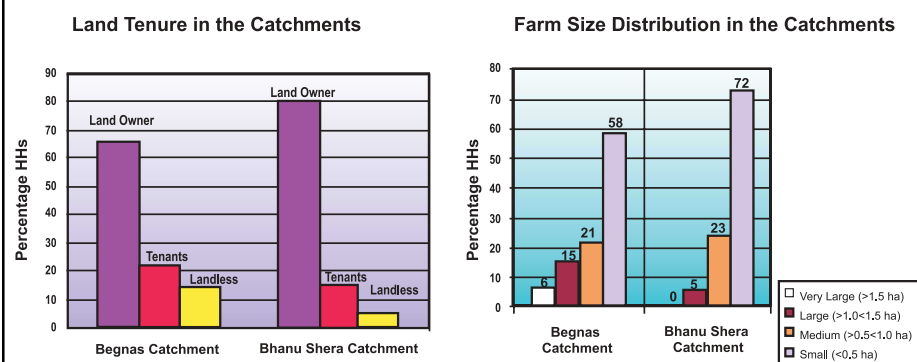
Source: District Irrigation Office, Kaski and Tanahu districts.

(0.5-1.0 ha) is also significant, with 21% and 15%, respectively. Likewise, many households are tenants (21%) and landless (14%). Nevertheless, the percentage of very large owners is quite small (6%). From the data of 53 households in the Bhanushera catchment, it can be derived that comparatively, there are numerous landowners in this catchment (79%), majority (72%) of which have small land, indicating more equitable access to land resource. The percentage of large farmers having more than 1.0 ha of land is negligible in this catchment.

The presence of a large number of small landholders in both catchments explains that a majority of households have low food sufficiency levels. Small landholders in the catchments either share crop or rent farmlands from large landholders for additional supply of food to their families. A large percentage of small landholders is hence also indicative of the poverty level of the catchments and their dependence on natural resources.

Ethnically, the community in the Begnas catchment is more homogenous as one upper caste (Brahmin) group is dominant (57%) followed by other upper caste groups (23%). Therefore, these groups are more influential in decision making in the community. In this particular case of a dominant group prevailing, other caste groups appear to accept that major decisions regarding community affairs are made by the dominant group. In contrast, the community in the Bhanushera catchment is more heterogeneous, and Newar and Magar (38% and 32%, respectively) are in the majority compared with the two upper caste groups. Thus, the dominance of one group is not prevalent, indicating a more egalitarian decision-making process in the community.

Figure 2. Land Tenure and Farm Size Distribution



Source: Field survey 2002.

## Impacts of FUGs and WUGs

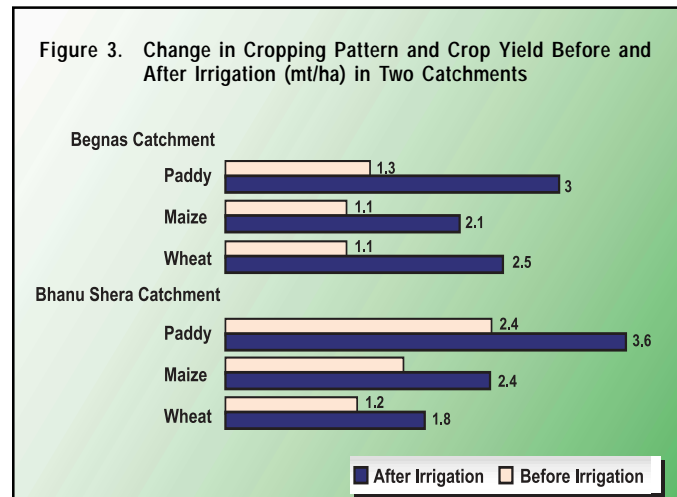
The success stories of FUGs and WUGs indicate that these groups have considerable impacts on livelihoods, environment, community, and socio-institutional aspects in the village. An effort was made to assess the effects of these changes.

### Livelihood Impact

At both catchments, agriculture has predominance in maintaining household living. In the Begnas catchment, 86% of households had agriculture as the main income source. Besides agriculture, 23.3% and 16.6% of households have small-scale businesses and services, respectively, as auxiliary income source. In Bhanushera catchment, 90% of the respondents (from group discussion) had agriculture as the main source of income and 25% of them had other auxiliary sources of income such as small-scale businesses and private/government services.

Agricultural production shows a significant difference before and after the irrigation system. Before the construction of the irrigation canal in the Begnas area, paddy production was only 1.3 metric tons per hectare (mt/ha), but soon after construction of the irrigation canal the production increased to 3.0 mt/ha. Correspondingly, production of maize and wheat also increased. The results are similar for Bhanushera catchment where renovation of the traditional irrigation system helped increase the production of paddy and other crops significantly.

WUGs in the catchments reported that increased availability of irrigation water has resulted in good agricultural productivity. Cropping pattern of rice, wheat, and maize as main crops however has not changed, but cropping intensity has increased after the irrigation scheme was constructed. Cropping intensity in the Begnas catchment has increased to 200% from 129% after the completion of the irrigation scheme (DIO, Kaski District) and improved farming systems through active promotion from NGOs and international NGOs (INGOs). This is supported by the increase in the use of chemical fertilizers, as reported by the respondent households in the Begnas catchment. From the 30 surveyed households, it was found that on average, a household uses chemical fertilizer in



Source: Field survey 2002.

the ratio of 0.4 kg per *doko* (equivalent to 25 kg) of animal manure. Few farmers have initiated large-scale coffee production and fruit farming.

Poorer families in the catchments reported that after improvement in the irrigation system, opportunity for wage employment (mainly in big landholders' farmlands) has increased. Besides, renting land from big landholders by poor and small farmers has increased due to less involvement of people from upper class in agriculture activities. Due to increased opportunity of wage employment, they have been able to buy more food. However, their overall living conditions have not changed significantly.

The requirement of fodder, firewood, litter, and timber determines the household's dependence on forest resources. In the Begnas catchment, 38% of the FUG member households reported that they are highly dependent on forest resources. They make frequent visits to the forest to gather firewood and fodder. Respondents also indicated that they could bring as much quantity of firewood for household consumption as they need, but they cannot sell firewood in the market. About 42% of households claimed to be partially dependent. They mostly bring fodder for livestock and occasionally (once in a year) apply to the FUG committee for timber. The rest of the member households (20%) expressed that they are not dependent on the forest at all. They use LPG or biogas for cooking, do not keep livestock, and have modern houses of bricks and cement. They have taken membership to FUGs for unforeseen benefits that may arise in future. The less dependence in forest products is also due to the tree plantation, as 60% of the total respondents (30) reported to have more than 10 trees on their own land. The presence of many trees can be attributed to the large landholding size. This further shows that farmers with large holdings tend to be less dependent on forest resources compared with small farmers and the landless. *Alnus nepalensis* (utis), *Castanopsis indica* (katus), *Schima walichii* (chilaune), *Artocarpus intergra* (katahar), *Shorea robusta* (sal), are the type of trees chiefly planted by households, which are mainly for fodder and timber.

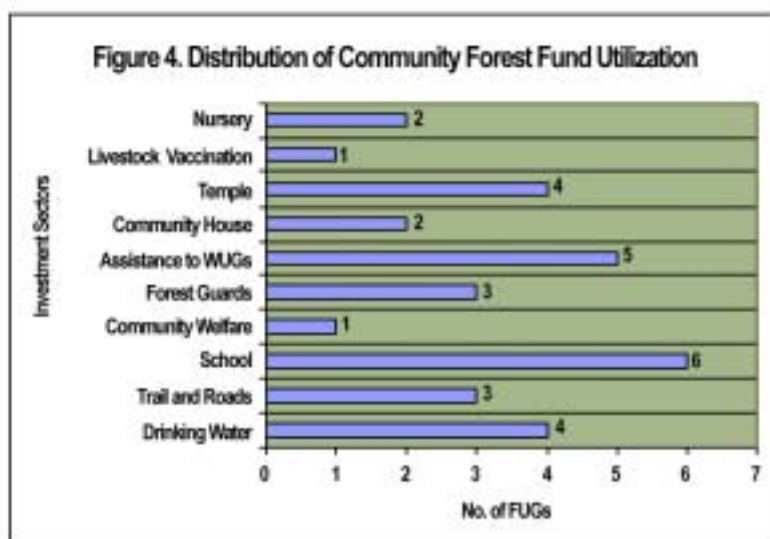
At the study sites, households including those who have switched to LPG for cooking were still bringing firewood from the forest for cooking livestock feed.

Income generation for the poor family from nontimber forest products (NTFPs) in forests has also not been achieved at the study sites. Consultation with FUGs revealed that there is high potential for income generation from NTFPs in forests of both catchments. Different kinds of herbs and sal leaves could be a very good income source for the poor. However, the FUG members cannot identify important and useful herbs in the forest and also do not know the extractable limits for the ones they can identify. In some cases, they are unaware of the market values of NTFPs they extract. This has led to underutilization of NTFPs and hence, a potential income source for improving the livelihood of the poor is being lost.

### Community Impact

Of the seven FUGs studied in the two catchments, six had invested some amount of their fund for upgrading and building infrastructures of local schools. Another major investment of the community forest (CF) fund (five FUGs in total) was found to go into assisting WUGs. FUGs either contributed cash or supplied timber from forests for maintenance of irrigation canals in the village. Drinking water and temple construction were the other main sectors where four FUGs had already made some investments. The CF fund was used for either maintaining the already existing drinking water scheme or launching a new one. Most drinking water sources that originated from CFs were protected by FUGs. Similarly, the community also prioritized trail and road construction and the appointment of forest guards where considerable CF fund was utilized by three FUGs. One of the FUGs was well ahead of the others in investing in community welfare and livestock vaccination programs in the village. A community welfare program was targeted to assist poor users who could not go to health posts during illnesses or spend even on death rituals.

The largest portion of the WUGs' collective funds was used for regular O&M of the irrigation system. Irrigation systems need year-round maintenance, which leaves WUGs less opportunity to invest in development programs in their villages. The discussion above indicates that the FUGs' role in income generation through



Source: Field survey 2002.

investment in various community activities has been beneficial for poor households in the community. Further, their contribution to the maintenance of irrigation systems has had a direct bearing on the livelihoods of the people dependent on agriculture. Investments in other social and economic activities have promoted cohesion among various groups, as well as furthered social development in the community. This is important in coordinating and integrating WUG and FUG activities in the future, which would have direct impact on the livelihood of the people.

### Environmental Impact

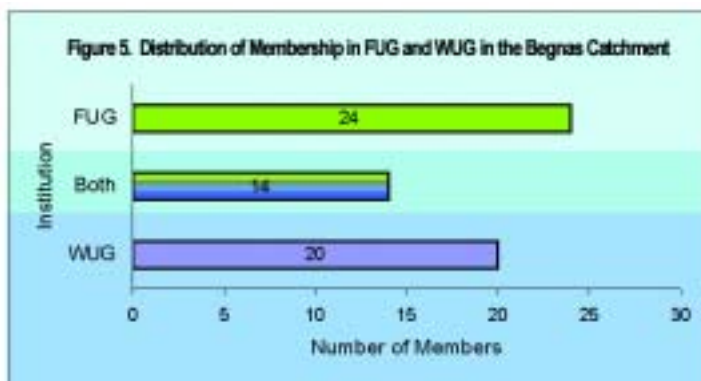
Environmental impact was measured in changes in resource quantity and quality before and after the emergence of FUGs and WUGs. Oral histories from elderly persons at the study sites provided valuable information on changes in resource use patterns and conditions. These insights formed the basis for assessing ecological impacts. With agricultural intensification at study sites, small irrigation systems management by communities are increasing in number. Correspondingly, informal WUGs are also increasing. In Begnas and Bhanushera catchments, users affiliated to WUGs and FUGs reported that water availability and forest conditions have improved over the years. User groups in their villages have started regular O&M of the canal system and regulation of forest products. Overharvesting of grass and fodder, irregular and illegal felling of trees have declined in both catchments. Users indicated that after the forest was handed over to them, it became thick and that firewood, fodder, and leaf litter availability in the forests has increased. In the Malmul FUG of the Begnas catchment, a separate grass committee within the FUG has been formed to regulate the distribution of grass among users due to its increased demand. Many users have started planting fodder and timber trees in their farmland, which has reduced the pressure on community forests.

### Socio-Institutional Impact

#### Membership in WUG and FUG

At the study sites, communities consisted of members who were affiliated with either one or both the institutions. Since there were many FUGs in a catchment, households had membership in at least one FUG, whereas only those households having land in the command area were members of the WUG. Considering this, members of FUGs and WUGs were overlapping. Figure 5 presents how WUG and FUG members overlap in the Begnas catchment.

Of the total 30 respondents in the Begnas catchment, nearly 50% are common members of both FUG and WUG. Unlike WUG membership that requires landholding in the command area as the principal criterion for membership, FUG membership is flexible, allowing membership to various categories of households (e.g., forest-dependent households that live close to the forest and partially or nondependent households that live far from the forest). Many FUG member households become members even though they are not dependent on forests for firewood and fodder. Many seek FUG membership due to consideration of future requirement of timber for construction. As FUG membership requires only an entrance or membership fee, many households become members. The



Source: Field survey 2002.

cost of participation of these households is, therefore, only the membership fee that they pay to the FUG. However, the cost for members that do not contribute actively into the management of forest is higher than those who are actively involved in forest management. Participation in group meetings in FUGs was higher (87.5%) compared with the WUG (60%), indicating users interest in the FUG due to the wide range of activities it is undertaking for the community's benefit.

### Gender Participation

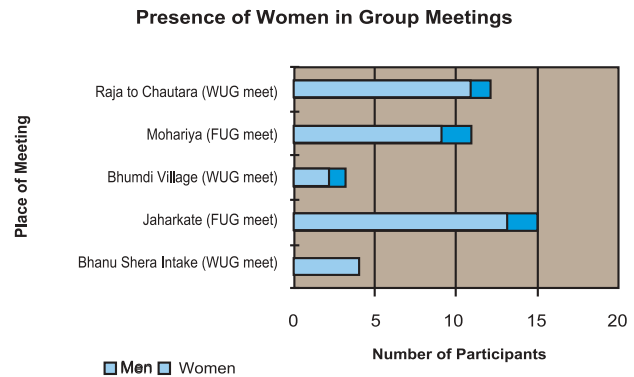
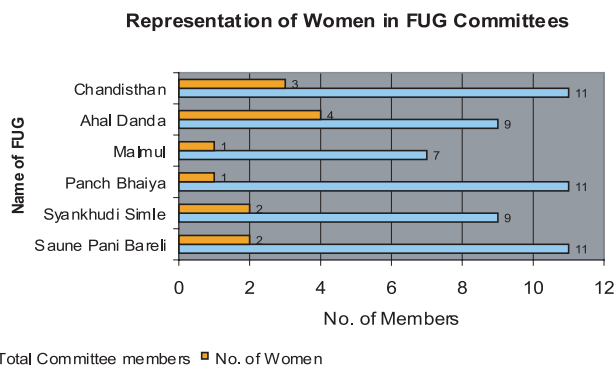
Equality in the roles of men and women in FUGs and WUGs was primarily determined by their representation in the committee and their role in the decision-making processes. The inclusion of women in one third of the total committee positions has been a rule in recent years. This rule, however, has been least followed by the majority of FUGs and WUGs at the study sites (Figure 6). In only two FUGs in the Bhanushera catchment do women hold one third of positions on the committee, and positions held by women were mainly that of ordinary members with less responsibility. Men filled the important positions such as that of chairperson, secretary, treasurer, etc.

Women's representation in WUG committees is no better than in FUGs. Only in the subcommittee of the Begnas WUG (Begnas-1) does the committee comprise onethird women. One WUG committee (Begnas-3) does not have a single woman member. In spite of existing rules that require one third of the committee to be women, both in FUGs and WUGs, women are under-represented and do not meet this quota. Besides these issues on numerical representation of women in committees, women's participation in meetings where they were present was reported to be negligible. From member households, mostly men attend committee and general assembly meetings. In only one of the surveyed households did the respondent say that his wife attends the meetings. This trend of only men attending meetings was evident during group discussions where women's presence was minimal. Where women were present, they did not speak until questions were specifically directed at them.

### Equity in Benefit Sharing

The successful institutionalization of FUGs and WUGs depends on how effectively equity issues, mainly usufruct rights and benefit sharing among users, are addressed

Figure 6. Distribution of Women in FUG and WUG Committees



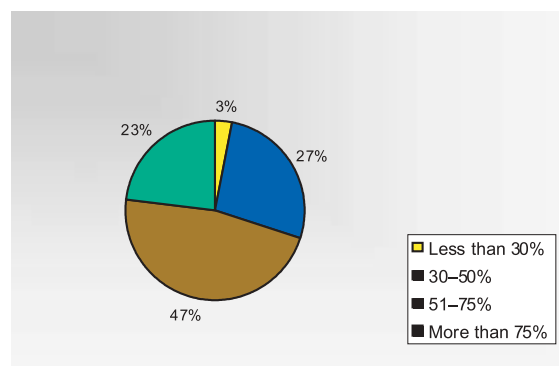
Source: Field survey 2002.

by them. At study sites, usufruct rights and benefit sharing mechanisms in FUG and WUG were complex and differed in nature. As land tenure rights are a prerequisite for getting benefit from irrigation water, equity between members with small and big landholdings and users at the head and tail is the chief concern. For instance, in the Begnas catchment, very few households (3%) reported that less than 30% of their land receives irrigation (Figure 10). However, a majority reported inadequate irrigation received (51–75%) in their field and nearly 25% of households reported having received irrigation for more the 75% of their land. Interestingly, 50% of the total (30) respondents indicated that they are not satisfied with the present management of the irrigation system in their village. It was interesting to note that all upstream farmers (15 respondents) expressed their satisfaction and downstream respondents expressed dissatisfaction.

There are fewer satisfied users at head end while dissatisfied users at tail end are reflective of the unequal access to the resource use. According to the users, this situation was partly due to lack of adequate consultation by DOI with the users while designing the project. Addressing the issue of inequality is more important in increasing the participation of the users in resource management. Initiation of on-farm water management practices in consultation with the farmers could help address this issue.

In FUGs, usufruct rights and benefit sharing among different members varied according to their differing dependence level on forest. Some users were highly dependent on forests and hence were actively involved in overall management. There were other sets of users who were partially dependent on forests. Few users were not dependent on forests at all. Benefit sharing by these different sets of users depends on the kind of contribution they give to forest management. Partially dependent users that do not actively contribute labor into forest management are liable to pay more cash for fodder and timber. Also, highly dependent users have priority over partially dependent users for getting any forest products. It is usually the poor in the society who are more dependent forest resources, as they are unable to spend for getting forest resources. Therefore, they also contribute more to the management of the forest.

Figure 10. Adequacy of Irrigation in Farmers' Fields



Source: Field survey 2002.

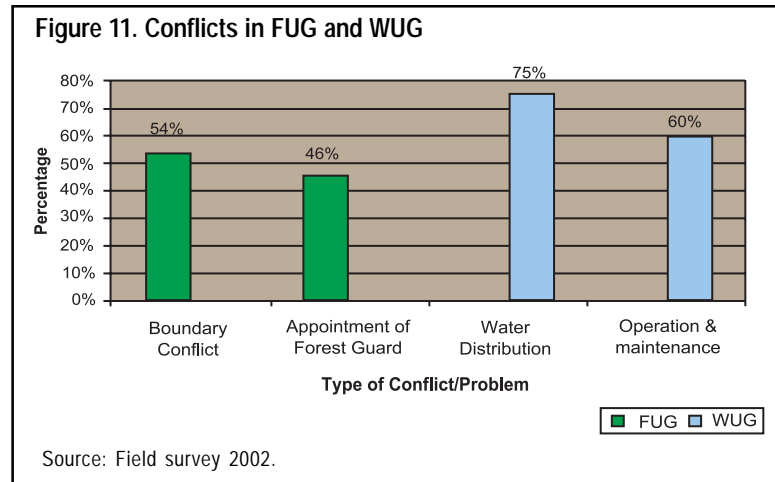
In some FUGs in the catchment, the equity issue appeared to be an inherent mechanism of a social change process. Some users who earlier were dependent on forest, in the course of the social change process, are no longer dependent on forest. Many members come from richer households who hold important positions in the FUG committee. After they opted out either from the committee or FUG, normally poor users who highly depend on forest take the opportunity to be a representative in the FUG committee.

#### Intrainstitutional conflicts

Intrainstitutional conflicts or problems within FUGs and WUGs were of differing nature, most of which arose from the respective resource nature of forest and water. Of the total 24 FUG members at the study sites, a majority (54%) cited boundary conflict as the major problem existent in their FUGs (Figure 11).

Boundary conflicts arose mainly from the encroachment of forestlands by adjacent private landholders. In one FUG, members said that landless immigrants from different parts of the country encroached on the forestland. The rest of the respondents (46%) mentioned problems like the rising number of temporary users due to market expansion, irrigation canal, and road construction through middle of forestland, etc. In another case, a new FUG was formed after it separated from a previous FUG. The reason for the separation was the users managing the forests came from two different hamlets (wards) of the same village development committee (VDC), reflecting the effect of political boundary in the management of the forest.

A majority (75%) of WUG members cited water distribution among users to be the main problem. Conflict over equal or fair distribution of water between head- and tail-ender communities was existent in two of the three WUGs studied. The respondents also indicated that community cohesion for the O&M of the irrigation canal was another major problem in the WUGs. Members were reluctant to contribute cash or labor for the maintenance of the irrigation canal in the case of the large irrigation system, Begnas IP. This sort of problem was not exhibited in the small irrigation system, Bhanushera. Majority of the users believe that the



DIO that had invested in the canal construction should maintain the canal system, indicating their reluctance or inability to contribute to the system's O&M.

### Interinstitutional Conflicts

Under the current situation of resource management at the study sites, sectoral institutions were increasingly found to enter into conflicts with each other. For instance, within the boundary of the Chandisthan FUG in the Bhanushera catchment, the Karnalitaar WUG also has its source and alignment passing through this community forest. Users of the Chandisthan FUG think that careless lying of hume pipes on the Karnalitaar irrigation canal is the main cause of landslides in their forest. Coordination of their activities, which is lacking at present, could be beneficial to both user groups in this respect.

### Integration of WUG and FUG Activities: Challenges, Opportunities, and Benefits

Discussions in the preceding sections reflect that the water and forest resources at the local level are managed separately, although these two resources have significant impact on the village livelihood. The main reasons behind this are the differences in the institutionalization process of these two resources management methods, as well as the sectoral focus of government plans and programs. However, lately it is realized that the integration of these two activities could help increase the benefit to the rural household in reducing poverty. Users found the idea innovative and useful for future management of these resources. The following paragraphs identify some challenges and opportunities for the integration of these two activities.

#### Challenges

The difference in the nature and structure of resources management and usufruct rights between WUAs and FUGs are a fundamental cause of the variation in functioning of these two institutions as well as their membership patterns and benefit sharing. The participation in FUGs is broad based, as a large number of

people who live surrounding the community forest boundary can be members of the institution. In WUGs, membership is limited to those who have land in the command area of irrigation. Therefore, socioeconomic diversity and differences in individual access and control over resources and degree of cooperation and conflicts between and among communities is an important aspect to be considered in the integrated activities at local level. Likewise, ensuring participation of the most vulnerable and disadvantaged groups as well as the fair distribution of benefits to them have remained as challenging as ever for the integration of these activities.

Other important areas for integration at the local level are dependent on provisions at the policy, legal, and institutional levels. Ambiguities at the policy level are manifested in the legislative provisions also. This is fundamental to the identification of rights, roles, and delineation of authority among various stakeholders involved in the management of natural resources. At the same time, the role of local elected institutions in INRM is also not explicit, which is impeding the coordination of natural resources activities at the local level.

### Opportunities

During the group discussions, participants mentioned that maximizing the resource use that is available at the local level could help increase the income level of the people in the village. Since income from agriculture is not enough to support the family, the income from natural resources could greatly contribute to the income of poor households. For instance natural resources such as limestone, sand, and riverbed materials (gravel and stones), etc. that have not been utilized fully could benefit both groups. These resources can be extracted and used sustainably if WUGs and FUGs can be integrated or linked to draw an appropriate plan to do so.

Likewise, the use of NTFPs could be an important and regular source of income, if properly implemented. Users from both groups expressed their belief that the existing potential has not been fully tapped due to a lack of joint effort and integration, which could help overcome these problems. Further, the resource generation from additional sources could also help implement other community activities that would directly benefit the community's needy.

Users believe the integration would help better water management at the farm level through increased water availability and improved on-farm water management practices. This would help resolve some of the intra- and interinstitutional conflicts from rising competition for the use of resources (forest products and water). Increased cooperation between the two sets of users could facilitate increased interaction to solve these problems. Besides, enhanced cooperation between the two users would lead to better management of the available resources, thereby increasing benefit to the larger population by tackling problems of erosion, landslides, forest encroachment, and scarcity of drinking water.

### Benefits

Participants of group discussions identified different benefits through the integration of the two institutions. Participants of group meetings mentioned that integration or linkage between FUGs and WUGs would increase cooperation, raise awareness among users, help in conflict resolution, and contribute to the

increased resource mobilization for the benefit of the community. Many participants indicated that integration of FUGs and WUGs would also improve their working relations with government agencies and can also help in coordinating government agencies.

Though users could not exactly tell about the nature of integration, they suggested that FUGs and WUGs should operate independently like it is now, but some activities can be coordinated by forming a higher level coordination committee represented by users from both groups. During the group discussion, participants also cited various conditions that need to be considered while looking for opportunities to integrate FUGs and WUGs. Participants highly emphasized the need to have the committee free of party politics.

Similarly, other important aspects as mentioned by users were inter-institutional learning and transparency in fund management. Users said that learning from each other's experiences in FUGs and WUGs could greatly help in bringing equity to the benefit sharing mechanism in both institutions. Users also expressed the need to prioritize women's and poor users' concerns while integrating the FUGs and WUGs.

## Conclusion

FUG and WUG management units comprise groups of communities from different hamlets (wards), villages, VDCs, or districts, who are the most concerned with and dependent on respective resources from a group and who conserve, use and manage the resources for collective benefits. Also, their functions are institutionalized. The activities of both these institutions have considerable impact on the livelihood, community, and socio-institutional aspect of the people in the catchments. At the two catchments, the livelihood of people is greatly supported by forest and water institutions through increased agricultural activities and supply of firewood, fodder, and litter to the users.

Inequities in the distribution of benefit in WUGs and FUGs and need to be addressed. Forest and water resources have effected land use changes in the catchment with cumulative positive effects. Failure to reduce gender inequality as indicated by women's representation and participation at the decision-making level are the weaker aspects of these institutions.

The case study of the two catchments presented here demonstrates that certain aspects of FUGs and WUGs can be linked at the catchment level. Consideration of the challenges and opportunities in the management of these institutions could be the starting point of any linking opportunities between the two. Overcoming policy-level and management challenges are important integrating these two institutions. The opportunities available from sustainable harvesting and commercial utilization of NTFPs are vital for improved and sustainable livelihood of the people. Reduction and elimination of intra- and interinstitutional conflicts would contribute to enhanced management of these two resources for increased benefit to users. One important aspect of the integration of FUGs and WUGs could be the interinstitutional learning. Therefore, action research in some of these areas needs to be developed and conducted to explore the possibility of integration of these two institutions.